CA 002069607 A1
NOV 1993

Consommation et Corporations Canada
Bureau des brevets
Ottawa, Canada
K1A 0C9

Consumer and Corporate Affairs Canada
Patent Office

(21) (A1) 2,069,607
(22) 1992/05/26
(43) 1993/11/27

(51) INTL.CL.[5] F04C-003/08

(19) (CA) **APPLICATION FOR CANADIAN PATENT** (12)

(54) Spherical Rotary Pump

(72) Roseborough, Trevor - Canada ;

(73) Same as inventor

(57) 4 Claims

410-145

2069607

Fig. 1

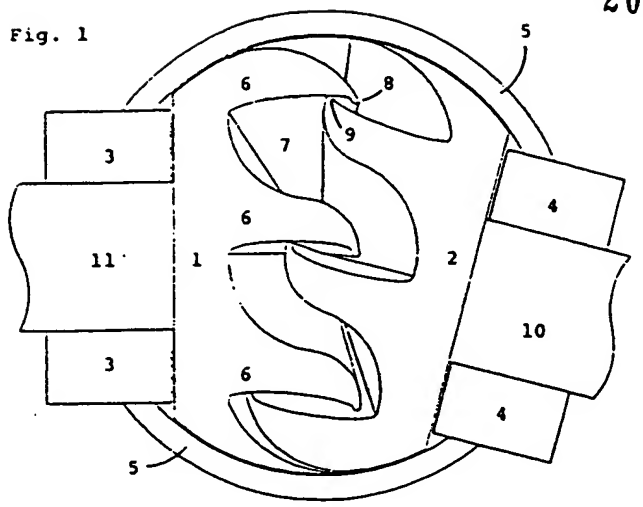


Fig. 2

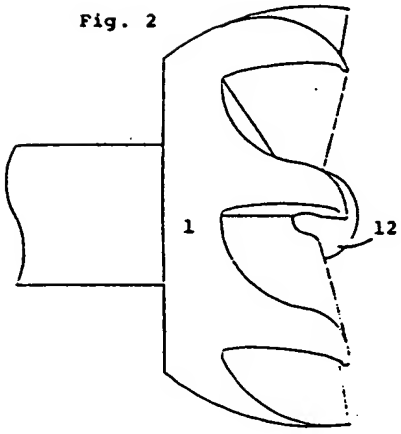


Fig.3

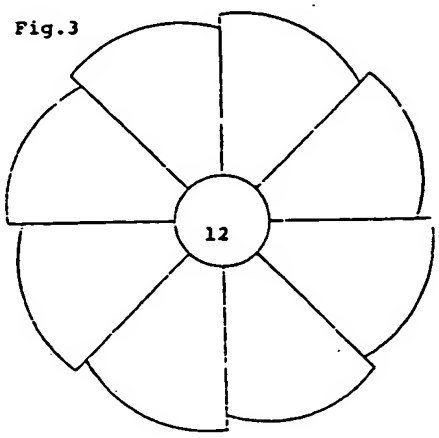
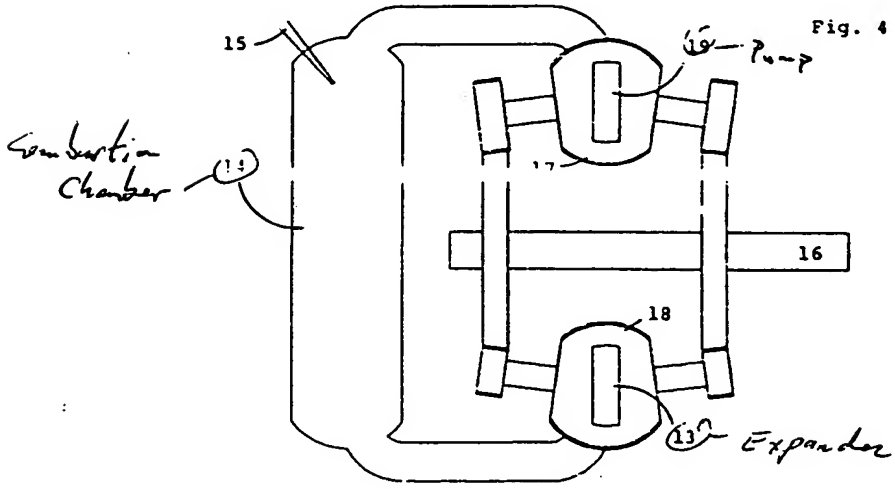


Fig. 4



ABSTRACT 2069607

SPHERICAL ROTARY PUMP

In rotary pumps with positive displacement it is common to use moving vanes within the pump to create a seal to move the working fluid. These vanes rub against the internal surfaces causing friction and the need for lubrication, which in turn limits the working temperature or requires cooling. This invention uses two rotors within a spherical housing to move a working fluid with near positive displacement. The rotors can rub against each other and the pump housing or can be supported by their bearings and turn on their shafts without actual contact and hence no friction or required lubrication. Leakage around the sealing edges is offset by a very high shaft speed due to a rotary and frictionless pump. Using a pump as compressor and another as a motor an engine similar to a turbine engine can be built but of a smaller size due to the near-positive displacement of the pump.

SPHERICAL ROTARY PUMP 2069607

This invention relates to a rotary pump that has positive displacement and can act in reverse as a motor.

In rotary pumps commonly used to move liquids and gases, these pumps often rely on vanes inside a housing to form a constant seal as the pump turns. These vanes slide against the internal surfaces causing friction and limit the speed at which the pump can turn. When these vane pumps move gases at high temperatures, lubrication and cooling of the moving parts are a problem. Engines using a vane pump as an air compressor to feed a combustion chamber and another pump as a motor, to create power and exhaust the gases, have many technical problems to overcome.

I have created a rotary pump with two rotors that turn within a spherical housing. The rotors are identical and mesh with each other when mounted at an angle. As the pump turns the space between the rotors on one side of the housing expands and draws in the working fluid through a port. A port on the other side of the pump housing expels the working fluid as the space between the rotors is compressed. The rotors can be completely supported by their bearings and synchronized by gears on the end of their shafts, and need not rub against each other or the housing thereby eliminating friction and allowing very high shaft speeds. Hence, the rotors and pump housing require no lubrication or cooling and can operate at temperatures as high as the materials can withstand.

In the drawings which illustrate the embodiments of the invention,

Figure 1 is a side view in section of the pump/motor,

Figure 2 is a side view of a rotor which embodies a ball centre,

Figure 3 is a front or face view of the rotor in Figure 2,

Figure 4 is a schematic side view of the pump/motor when configured as an engine.

In Figure 1 the rotors 1 and 2 are shaped identically such that they mesh when held together at a fixed angle by their bearings 3 and 4 inside a spherical housing 5. Each rotor has a number of blades 6 that rise up from its face with a concave surface 7 on one side that terminates with an edge 8. As the pump turns the edge 9 of the other rotor sweeps along the surface 7 until the stroke ends and the edge 8 at the top of the surface 7 begins to sweep along the concave surface of the edge 9. When the shafts 10 and 11 turn together a working fluid is drawn in one side, through a port in the housing, and pumped out the other. When a working fluid is forced in one side and allowed to be expelled out the other torque is produced on the shafts 9 and 10 and the pump acts as a motor.

Figure 2 shows the embodiment of a central sphere or ball 12 cast in rotor 1 that fits in a matching socket of the other rotor 2. The ball serves to minimize the length of the sealing edges within the pump and may be varied in size to change other properties of the pump. If necessary groves (not shown) may be cut in the ball to allow both rotors to be fitted together. The face of the rotor 1 with the ball 12 is shown in Figure 3.

Figure 4 is a simplified schematic representation of an engine made with gears connecting the pump/motors. When two (or more) of these pumps work off a common drive shaft 16 with one pump 18 turning faster or being larger than the other 17 an

engine is formed, Figure 4. As the shaft 16 turns a volume of air is drawn in the intake port 19 and is pumped out a port on the other side into a combustion chamber 14. Fuel from an injector 15 is burned with the air and produces a larger volume of combustion gases which are forced through the faster or larger pump 18 and exhaust port 13. This produces the engines power.

THE EMBODIMENTS OF THE INVENTION IN WHICH EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A rotary pump comprising two rotors that mesh when mounted at an angle to each other, that are supported on their shafts by bearings, and are incased in a spherical pump housing that has intake and exhaust ports.

2. A rotary pump as defined in claim 1, in which the rotors have blades cast in the face that rise up with a concave sealing surface on one side that terminates with a sealing edge on the same side.

3. A rotary pump as defined in claim 1, that has positive displacement when all of the sealing surfaces slide against each other, or has near-positive displacement when all of the sealing surfaces are separated by a small gap when the rotors are synchronized by gears and supported by the bearings within the spherical housing.

4. A rotary pump as defined in claim 3, that can operate in reverse as a motor, and form a fuel and air engine using gears and one or more pumps to force air into a combustion chamber and one or more pumps as motors to exhaust the combustion gases .